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Osteoarthritis in Young Population - Clinical and Pathological Attributes

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Abstract **Aims and Objectives:** To identify the causes of osteoarthritis in young population. To describe clinical presentation and laboratory findings. Highlight the differences between osteoarthritis in young and older population. 4. Compare the observed findings with published literature. **Results**: A total of 30 cases of Osteoarthritis in Young Patients (15-50 years) was studied and reveals the following causes. Genu Varus 8 (26.7%). Genu Valgus 3 (10%) Obesity 4 (13.3%) Trauma 3 (10%) Coxa Vara 10 (33.3%) Coxa Valgus 1 (3.3%) Alcoholic 1 (3.3%). Regards to clinical presentation pain is most common symptom (100%) followed by difficulty walking (50%) restriction of movements (43%). Duration of Arthritis and its clinical features varied from 1 year (Genu Varus) to 9 years (Obesity). Regards to sex, males (76.6%) are affected more than females (23.4%). Regards to Age, minimum age at onset of Arthritis is 28 years (trauma) to maximum of 50 years (Genu Varum). Inflammatory Markers (ESR is within normal limits and CRP is negative in all patients) suggesting the degenerative nature of disease and ruling out infectious/inflammatory process. Biopsy is not advised in any one of the patients. **Methods:** Patients with signs and symptoms of osteoarthritis in the age group of 15-50 years are selected and studied during period of one year (1-6-2024 to 1-6-2025). Characteristics included in the proforma are age, sex possible cause, duration, clinical presentation (sign/symptom), site/joint involved, imaging finding, laboratory features such as CBP, CRP, ESR including biopsy changes. The descriptive findings are mentioned. **Discussion:** Osteoarthritis in young generation is a hidden and masked entity which need to be detected at earliest stage to prevent progressive joint disease. Identification of the underlying causes and the avoidance /treatment can slow or prevent the condition. The clinical presentation and pathological features can vary in contrast to adult variant. The pathogenesis depends upon the underlying cause and prognosis is related to the severity of the underlying condition. **Conclusion:** In the present study various risk factors for osteoarthritis has been identified. These modifiable conditions can be treated earlier or avoided by proper interventions to prevent or slow the joint damage and progressive disease.

Key Words Arthritis, Young, Degeneration, Developmental, Genetic, Injury

INTRODUCTION

Osteoarthritis in Young people is an emerging under reported entity which needed to be detected at the earliest, to avoid permanent joint damage and lessen the burden on public health system along with preservation of productive years in young generation. The causes vary from trauma, genetic, obesity, developmental anomalies and categorized as primary or secondary. The diagnosis of osteoarthritis depends on combination of clinical examination, imaging and investigative tools. The pain which is characteristic of osteoarthritis is tolerated well in early stage of disease and patient usually presents late in course of disease to physician, in addition ultrasonography is recommended to evaluate joint disease [1]. Literature suggests that younger set of patients with osteoarthritis are relatively more likely to experience sense of disease and its physical and mental effects, leading to overall dissatisfaction [2]. Regards to role of race and ethnicity it was noted that osteoarthritis in young age is more prevalent in African Americans compared to other groups [3]. The effect of occupation and physical activity is also related to development of disease as observed by increased frequency in military personnel and athletes [4]. Evaluation of outcome in knee and Hip osteoarthritis of young includes PROM (patient reported outcome measures) that take into consideration the pain and function of joints [5]. The management options include initial conservative strategies

like weight reduction, muscle strengthening, aerobic exercises and then arthroscopic interventions, followed by more invasive surgical procedures if previous measures have failed [6]. Early identification of markers of osteoarthritis is critical and include childhood joint injury, developmental conditions such as early adulthood varus /valgus malalignment are proposed to be associated with osteoarthritis later in life [7]. The pathogenetic concepts in recent years has shifted from degeneration to inflammatory injury with total joint failure [8]. Sex predilection is comparatively more for females due to anatomical structure of female knee joint which predisposes to arthritis [9]. Gadolinum enhanced MRI (dGEMRIC) is proved to be useful in detection of early structural changes of joint in osteoarthritis patients [10].

METHODS

Patients with signs and symptoms of osteoarthritis in the age group of 15-50 years are selected and studied during period of one year (1-6-2024 to 1-6-2025). Characteristics included in the proforma are age, sex possible cause, duration, clinical presentation (sign/symptom), site/joint involved, imaging finding, laboratory features such as CBP, CRP, ESR including biopsy changes (Table 1). The descriptive findings are mentioned.

RESULTS

A total of 30 cases of Osteoarthritis in Young Patients (15-50 years) was studied and reveals the following causes; Genu Varus 8 (26.7%), Genu Valgus 3 (10%), Obesity 4 (13.3%), Trauma 3 (10%), Coxa Vara 10 (33.3%), Coxa Valgus 1 (3.3%), Alcoholic 1 (3.3%). Regards to clinical presentation pain is most common symptom (100%) followed by difficulty walking (50%) restriction of movements (43%). Duration of Arthritis and its clinical features varied from 1 year (Genu Varus) to 9 years (Obesity). Regards to sex, males (76.6%) are affected more than females (23.4%). Regards to Age, minimum age at onset of Arthritis is 28 years (trauma) to maximum of 50 years (Genu Varum). Inflammatory Markers (ESR is within normal limits and CRP is negative in all patients) suggesting the degenerative nature of disease and ruling out infectious/inflammatory process (Figures 1-7). Biopsy is not advised in any of the patients.

Table 1: Proforma for osteoarthritis in young population

S.no	Age in years	Sex	Possible underlying cause	Duration in years	Clinical presentation	Site involved	Imaging findings	Laboratory findings Haemoglobin (Hb) CRP, ESR (including biopsy)
1	41	M	genu varum	2	Pain	Knee	Narrow joint space, osteophytes	Hb-12, CRP negative
2	48	F	Genu varum	6	Pain	Knee	Narrow joint space, osteophytes	Hb-13 CRP negative, ESR-10
3	49	M	Genu varum	4	Pain and difficulty in walking	Knee	Narrow joint space, osteophytes	Hb 14, ESR 12, CRP negative
4	47	M	Coxa vara	7	Pain and difficulty in walking	Hip	Incongruent head	Hb 11, ESR 18, CRP positive
5	45	M	Genu valgus	3	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb-11 CRP negative, ESR-10
6	50	M	Genu valgus	5	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb-14 CRP negative, ESR-08
7	49	F	Obese	9	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb-12 CRP negative, ESR-13
8	44	M	Coxa vara	4	Pain and difficulty in walking	Hip	Incongruent head	Hb 10, ESR 17, CRP negative
9	48	M	Genu valgus	3	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb13, CRP negative, ESR-9
10	50	M	Coxa vara	8	Pain and difficulty in walking	Hip	Incongruent head	Hb 13, ESR 06, CRP negative
11	36	F	Coxa vara	2	Pain and difficulty in walking	Hip	Incongruent head, collapse	Hb 12, ESR 08, CRP negative
12	28	M	Trauma	3	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb-11 CRP negative, ESR-10
13	50	M	Coxa vara	3	Pain and difficulty in walking	Hip	Narrow joint space, marginal osteophytes	Hb 11, ESR 08, CRP negative
14	49	M	Trauma	2	Pain and difficulty in walking	Hip	Incongruent head, collapse	Hb 12, ESR 08, CRP negative
15	37	M	Alcoholic	1	Pain and difficulty in walking	Hip	Narrow joint space, marginal osteophytes	Hb 14, ESR 09, CRP negative
16	44	F	Obese	2	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb-14 CRP negative, ESR-08
17	49	F	Obese	4	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb-12 CRP negative, ESR-13
18	42	M	Coxa vara, alcoholic	1	Pain and difficulty in walking	Hip	Incongruent head, collapse	Hb 12, ESR 17, CRP negative
19	48	M	Genu varum	1	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb13, CRP negative, ESR-9
20	49	M	Coxa vara	3	Pain and difficulty in walking	Hip	Incongruent head, marginal osteophytes	Hb 11, ESR 16, CRP negative
21	46	F	Coxa varum	2	Pain and difficulty in walking	Hip	Incongruent head, collapse of head	Hb 11, ESR 18, CRP negative
22	48	M	Trauma	2	Pain and restriction of movements	Knee with varus	Narrow joint space, osteophytes, varus stress positive	Hb-14 CRP negative, ESR-10
23	49	M	genu varum	2	Pain and difficulty in walking	Knee	Narrow joint space, osteophytes	Hb 11, ESR 11, CRP negative
24	47	M	Coxa vara	3	Pain and difficulty in walking	Hip	Incongruent head	Hb 14, ESR 13, CRP positive
25	48	M	Genu varum	3	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb-13 CRP negative, ESR-12
26	49	M	Genu varum	2	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb-13 CRP negative, ESR-09
27	46	F	Obese	6	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb-11 CRP negative, ESR-18
28	48	M	Coxa vara	2	Pain and difficulty in walking	Hip	Incongruent head	Hb 15, ESR 15, CRP negative
29	49	M	Genu varum	1	Pain and restriction of movements	Knee	Narrow joint space, osteophytes	Hb12, CRP negative, ESR-8
30	40	M	Coxa valgum	2	Pain and difficulty in walking	Hip	Incongruent head	Hb 11, ESR 08, CRP negative

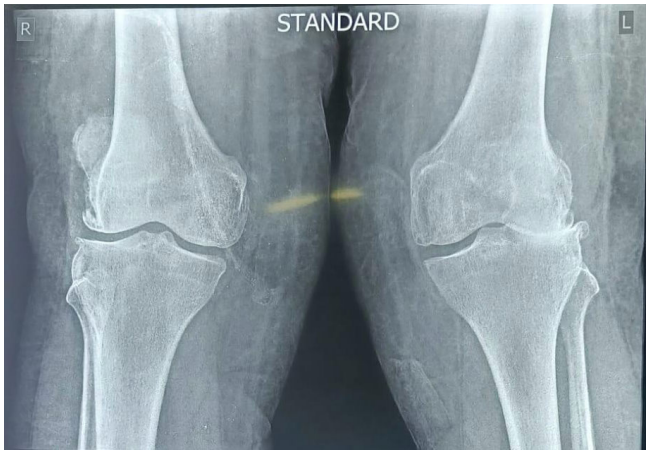

Figure 1: Shows in left knee genu valgus with osteoarthritis changes showing narrowing of joint space, osteophytes, sub chondral sclerosis

Figure 2: Shows in right, knee genu valgus with osteoarthritis changes showing narrowing of joint space, osteophytes, sub chondral sclerosis

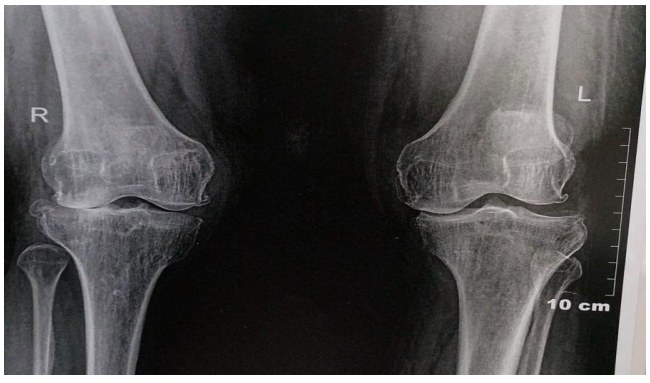

Figure 3: Shows in right, knee genu valgus with osteoarthritis changes showing narrowing of joint space, osteophytes, sub chondral sclerosis

DISCUSSION

Osteoarthritis also referred to as degenerative arthritis is an age-related process, however osteoarthritis can be observed in young active individuals due to developmental deformities, trauma, obesity, intense physical activity and

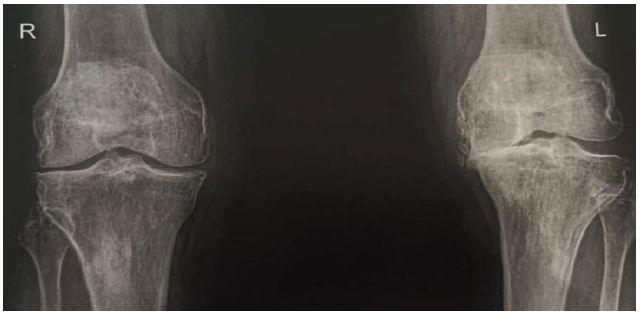

Figure 4: Genu varus in left knee and with osteoarthritis changes showing narrowing of joint space, osteophytes, sub chondral sclerosis

Figure 5: Genu varus in right knee and with osteoarthritis changes showing narrowing of joint space, osteophytes, sub chondral sclerosis

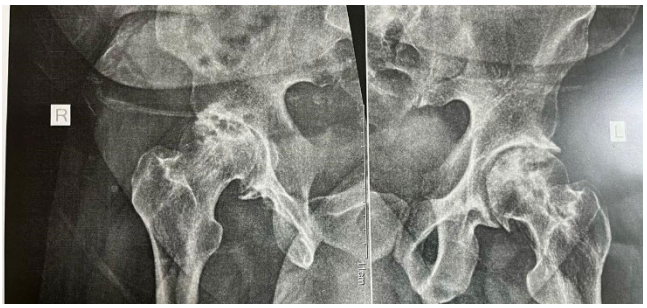

Figure 6: Shows right side coxa vara with osteoarthritis changes showing narrowing of joint space, osteophytes, sub chondral sclerosis

genetic diseases such as haemochromatosis, ochronosis which can initiate degenerative changes in the joints [11]. Regards to trauma and its role in arthritis, knee injury involving anterior cruciate ligament, meniscus and microfractures of cartilage appears to be the key and surgery to repair the ligament tear doesn't point to reduction in the chance for development of arthritis [12]. Arthritis of HIP clearly is more related to dysplasia or developmental defects of HIP compared to injury even though injury due to rigorous activity is linked rather than to routine activities [13]. Obesity contributes to joint damage not only by mechanical

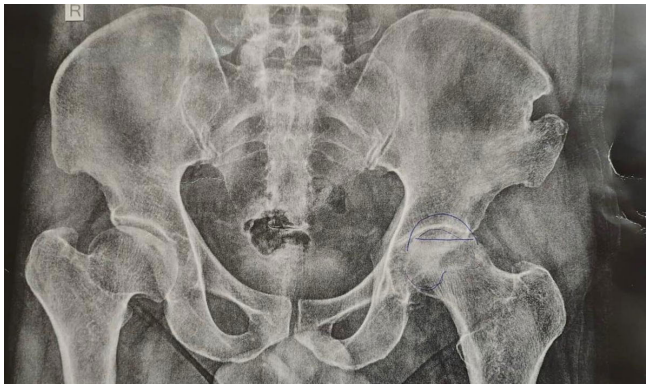

Figure 7: Shows right side coxa vara and left side coxa valgus in each hip with osteoarthritis showing narrowing of joint space, osteophytes, sub chondral sclerosis

stress but by biochemical means, through release of various proinflammatory cytokines (IL-6) from synovial fibroblasts mediated by leptin released from somatic adipose tissue [14]. In the present study arthritis is noted in young patient (28 years) due to joint trauma which is in comparison to studies from Australia where in sports injuries are rampant in young population with attendant risk of arthritis [15]. Literature has pointed out that various conservative interventions such as orthotic devices/braces has helped to reduce joint burden due to various developmental and malalignment conditions by reducing symptoms and improving functional levels of joints which proves that these conditions contribute to arthritis [16]. The frequency of malalignment conditions in the present study is higher (73. 3%), while obesity (13. 2%) is lower and trauma (10%) is higher compared to other studies [17]. The clinical differences in the onset and presentation of disease between young and old arthritis patients points to the fact that young patients can withstand pain for longer (even though it affects their physical and mental wellbeing) before seeking the help of clinician and also various conservative therapies (muscle strengthening exercise, weight loss, orthotic devices/braces, tibial osteotomy) should be offered along with early identification of risk factors in this sub set of patients contributes to overall wellbeing. While surgery is advised only after 55 years of age keeping in mind the limited life of prosthetic joint and to avoid complications such as prosthetic joint failure in young due to their active life style which may warrant revision surgery [18]. The role of genetics in the causation of osteoarthritis in young is emphasized by the fact that the disease is more frequent in monozygotic twins, those with family history of disease at early age, all linked to specific gene loci revealed by genome wide association studies and risk is postulated to be due to variation in the regulation of gene expression [19]. The beneficial effects of exercise on arthritis are through inhibition of inflammation, slowing ECM degradation in cartilage, prevention of apoptosis, favouring autophagy which has protective effect on joints, in addition to modification of ncRNA thereby controlling the gene expression that favour arthritis [20]. The association of Vitamin D deficiency and risk of Osteoarthritis in young is proposed as noted by low vitamin D levels in young osteoarthritis patients. These findings don't predict the clinical severity of osteoarthritis in relation to low Vitamin D levels even though odds /chances of developing osteoarthritis are high [21]. Literature has suggested the utility of osteotomy in fibula in young primary osteoarthritis as proved by improvements noted by clinical, functional and radiological methods [22]. Studies performed on shoulder joint to assess risk factors for osteoarthritis in young age has revealed the role of BMI, Hypertension, polyarthritis and intense muscular activity of shoulder that can contribute to the mechanism of primary shoulder joint arthritis in young [23]. Bone remodelling in arthritis is evaluated by imaging techniques which can highlight the mechanisms of remodelling along with its clinical implications. In early remodelling phase MRI has value to detect subchondral bone sclerosis, while Ultrasonography is critical to delineate the pathological osteophytes of soft tissue and bone and CT scan is more superior to X ray in evaluation of structural pathological aspects [24].

CONCLUSIONS

In the present study various risk factors for osteoarthritis has been identified. These modifiable conditions can be treated earlier or avoided by proper interventions to prevent or slow the joint damage and progressive disease.

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